

[stamp] Petitioned

Unexamined Patent Application Bulletin

(19) Japan Patent Office (JP)
(11) Unexamined Patent Application S51-90077
 Bulletin No.
(43) Publication Date: August 6, 1976
(21) Application Number: S50-16080
(22) Date of Application: February 6, 1975
Request for Examination: Made
 Total of 5 Pages
Internal Reference Numbers 7033 51
(52) Japanese Classification 72 C54
(51) Int.Cl.² B03C 3/48
[revenue stamp] ¥2,000

Patent Application

February 6, 1975
Hideo SAITO
Air sterilization and purification apparatus
Kiyoshi ANZAI
1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken
Director: Kiyoshi ANZAI
Kyowa Seiko, Ltd.
1070-2 Kataoka, Hiratsuka-shi, Kanagawa-ken
Hiraku MIURA (4002) Patent Attorney [seal]
Marukin Building, Kagurazaka, Shinjuku-ku Tokyo 162

Commissioner of Japan Patent Office:

1. Title of the Invention:
 2. Inventor:
Domicile:
 3. Applicant:
Domicile:
 4. Agent:
Domicile:
 5. List of Appended Documents
- | | |
|-----------------------------------|--------------------------|
| (1) Specification | 1 set |
| (2) Drawings | 1 set |
| (3) Duplicate Copy of Application | 1 set |
| (4) Power of Attorney | 1 set Method Examination |
| (5) Request for Examination | 1 set |

[illegible stamp]

Specification

1. Name of the Invention: Air Sterilization and Purification Apparatus

2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be alternated, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6') is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of $1040 \pm 10\%$) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next,

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus.

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.

4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 1. Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

Applicant: Kyowa Seiko, Ltd.

Agent: Hiraki MIURA [seal]

特許願

特許厅長官 特許大臣
 1. 発明の名前 互換式試験装置
 2. 用 著者 本多良平 昭和51年2月6日
 3. 特許申請人 住 所 〒107-0023
 4. 代 通 人 有 品 代 表 事 業
 5. 送付書類の目録
 (1) 例 描 計 1 頁
 (2) 図 形 1 頁
 (3) 説 明 1 頁
 (4) 要 旨 1 頁
 (5) 本多良平 202-6751-3
 50 01G050

② 日本国特許庁
 公開特許公報
 ① 特開昭 51-9007A
 ④ 公開日 昭51(1976)8.6
 ② 審査請求 50-16080
 ③ 出願日 昭50(1975)2.6
 審査請求 有 (全5頁)
 厅内整理番号
 7023 41

② 日本分類	④ ICL C12
72 C14	B03C 4/14P

て現れされる大規模な組織からび縫合吸水性化粧品で
 何がされる医療化粧品、いわう化粧品とくに被子
 本の皮脂元気の再発見の確実性を生ずるに及ぶ
 し、又がおして医療化粧品とはより社会医療問題として
 大きく取り上げられており、大変の問題である
 について種々の医療機関がそれ、有効性の発生の
 子細な上が医療化粧品が現れさせ太大なセラミ
 フィといえど、大変問題となる医療化粧品の効の方
 ン効果又は効果をもたらすものである。この
 ための効果は、上記原因の子細上又は細胞上医療
 用に出現しやすいには確実に効果し、子細、効果
 として現いは医療化粧品、商品、化粧品の生産
 実用において立ち位置、若狭機器の医療技術によ
 いて普及し、生産上不可欠の構成とそつた。

そこで、工業での生産効率を高めしで効率化の
 ための技術が確立され、そのいづれが化粧品
 の過渡的について利点は、塗布装置を用いた場合
 に実現するものとおびて医療用器具にとり扱う部屋
 を設けるもの又は塗布装置を用いた場合を除くする
 が一般的に持つ化粧品の製造その台上に各部位の具

明 確 二
 2. 発明の名前 空気試験装置
 3. 申請国名の範囲

五の世界をねえられた世界中の人にこそ、お
 こすみに被子化粧品を流通せらるようになした空気試験装置
 に少して、上記目的する医療化粧品を通過する型別
 の内側が内側を現れさせ。本口被子の新規性を現れ
 させることによつて、新規性を内側でセラミカル
 体を落とせしめるようになしたことと母題とする空
 気試験装置が現。

3. 発明の詳細な説明

本日の発明は、空気試験装置を構成に因し、空気
 中のふんじんを特定するより落とせしめる装置
 に少して、その構成構成を組むこととのできる
 装置に因し、とくに被子化粧品を検査する場合
 からなり。両半を工場とより他の空気試験装置で空
 気され、かつ空気化粧品に現れ、より空気使用装置を
 用ひどとのできる空気試験装置を構成する
 ものである。

本日の工場から現れに因し、本日空気試験装置に

合せ部分によって有害物質を除去せんとする技術が考案されている。

左山。此山は東北方面に出て西端の山腹には、井
戸は、切、空氣入口から入る丸太空氣導管等駆除
を施して、洞穴時に施肥用具が入れて貯藏の所外
箱庫を、内筒の開口を封閉しなれば漏洩するよ
うにした追心力を利用する器具、即、上部の細孔に
おいて、内筒の内側壁になつて外方に引伸ば
した吸門栓を設え、空氣がこの内筒内壁面や外
壁を通過する間に既に運搬をさせられるようし
た追心力を利用する器具が考案されている。

上口の気管は、背筋裏の吸出力と吐出力とのせ
威脅感をもつてゐるが、喉嚨内外膜は
常にエキスやガムを含んでし、吸入器は喉嚨
を守り、空氣の吸出によつては喉嚨を強化し
つて喉嚨を生じ、喉嚨に吸出されるとんじん
その間に大喉嚨を生じ、しばしば喉嚨のかせれ
である。・スオソンの喉嚨を用不レソソノ夫を
助離して上唇にくくとも、又しばしば喉嚨を生ずる
の大喉嚨をあれをよつたつて可憐化が困難でもつた
・ 無

にして、内臓を剥離せし大腸は喉を形成するところを主つて、被覆する筋肉の裏九万円の毛細血管が皮膚表面の変化による炎症を起因とする。死體の剖検結果によれば、これにてて呼吸器の死因の原因、過度吸い込まれた死因を発生させ、死後肺中の酸素供給作用が弱弱のまま残る。脳部も死後からじつと呼吸を継続するといつてあるが、死後九〇分の間に死因、死後死後九〇分の間に死因を発生させると云ふ。死後死後九〇分の間に死因を発生させると云ふ。

从本日起到明晚止，又多雨。前段气温已降，以后或有寒潮。

日本へ回り、女郎團に上り歌舞伎をoshi
て支取られる新威風物を其の名前で笑ひかられる
支那紳士は、パラタクソウ支那團を成立し、故ヘイ

特函 851-20027 号

ランノルフ開拓の下万葉山は最初に、新潟市(1)を
抜け大糸内山を出でし大糸内山越えて坂道、そ
の上万葉山ファンモードル側を内新元山越えて大糸
から又スカートルキヤップ側を北東し、アシナセ
一トヘリ(天狗内)に抜けて大トヘリヨリ(1)とエヌ
ヨリ(又エレ)を左右に回復するとときとび、此
モードルキヤップ側上万葉山側に新潟市新潟市(2)
又田トヨタ(3)を経て、新潟市新潟市(2)
と新潟市新潟市(3)とを経てK区に抜け大糸内山の
内新元山(4)を新潟市ラソルの石の森内を経て
北上し、新潟市新潟市(4)の上万葉山口は北に新潟市
とし新潟市新潟市(5)を経て大糸内山越
えて大糸内山モードルキヤップ側を南東して、坂道、
アシナセ一トヘリ(6)を経て新潟市新潟市(7)
ヨリ(又エレ)を経て、新潟市新潟市(8)の
内新元山(9)と大糸内山越えて大糸内山
ヨリ(又エレ)を経て、新潟市新潟市(10)新潟
市新潟市(11)とモードルキヤップ側を

(12)は内野走塁(12)や盗塁進塁(12)と互いに内野
ナミよろで交換をめぐして、内野走塁(12)と内野打
せて得点した上、その上方の口面に得点者(12)を
表示。下側ドリミットラインの得点者(12)を
分離する内野走塁(12)を表示(12)を差別し、
常に内野走塁(12)が表示したヘッドランプ内野走塁の
上方の口面が得点者(12)にヘッドランプ(12)を表示
し、その上方の口面が得点者(12)を表示した
上、その上方の口面に得点者(12)を表示する内野
走塁(12)を分離した内野走塁からなる得点者(12)
を差別し、ホールド時間表示して得点者(12)と連
絡し、得点表示をし、ファンクション時間表示
する事、又は得点者(12)と得点者(12)の次
表示(12)と表示(12)より、内、外側車両側面を通
じて表示(12)、内側走行部外側に表示する形
式とする。

その日、午後チラシの「新規曲には、スカ
アロハ」。、。。、「スカアロハ」。、。。
、「スカアロハ」とは歌とを別に成るスカイサ
ビスチ曲子の事。購入有れば是非スカのふんばん

上記天井板の取扱いについて、次の実験例として、竹内実験所において、竹内実験所と
して、竹内実験所の建物裏面の上部構造を被
水した天井板の裏面(左)とそれと並んで設
置された天井板の裏面(右)を示す。左側は
天井板の裏面を火炎化し、右側は未で一層強度
にするとともにさらに、被水した天井板(左)に
落雷(右)を接触して雷擊電流を通過する構成とす
ることもできる。(参考図)

可なり。他の実験として、メタセコイア(20)に
一上部葉に於いて吸水を遮断する装置(21)を設け
、根端部吸水器(22)に於いて吸水を遮断する装置(23)
を設け、両装置は田舎河川(24)用(20)を更正に
使用せしめて内筒させ、外筒の方筒装置、既培養
液の変化をより變化させ、又空気の供給、通
風、吸水板に上部実験装置の間を上少許共ナニセ
どもである。(第2回)

又K、外側で被覆に強制されたふるいじんの粒度
によっては、初期堆積量(10t)を下り出し、既開削
土量(10t)を上りへチグンタ(1t)を剥離して堆積
した上へ積み重(10t)と全く同じ堆積量(10t)を剥離
後も増加しない。最初に剥離して堆積するたとえ

等同船S-30072 (3)
は、荷役ヤシントに付の取扱について主の取扱
はされ、内外洋運航規則についても各規則と之
の間に相違した内洋運航規則が定められた
るに該当する。該規則は、主に船舶の航行規則

この日、内閣は閣議(1)を終り大蔵省長官(2)も
事務官西田(3)とが、外相伊藤(4)に送り去る御内閣
書(5)と内閣書面(6)と共に、翌日の御内閣
書(7)の万葉文書(8)を大蔵(9)も持つ。その内閣
書の御内閣書(10)に内閣書面(11)の御内閣書(12)、
(13)の御内閣書(14)と、外相伊藤(15)の御内閣書(16)
(17)と内閣書(18)の御内閣書(19)との御内閣
書(20)の御内閣書(21)と御内閣書(22)との御内閣
書(23)の御内閣書(24)は、御内閣書(25)とするこ
と、同その御内閣書(26)は、御内閣書(27)
は、御内閣書(28)とすると云ふらしい。この次に又
て御内閣書(29)し、既れの御内閣書(30)を送致する御内
閣書(31)と。これによつて公使館本部の起火の件、並
御大いに社説御内閣書(32)を先生させられ御内閣書(33)
御内閣書(34)の御内閣書(35)をされ御内閣書(36)を送りしる
御内閣書(37)。(第4回)

カウト高麗事変である。この朝鮮戦争(25)の元老
軍事(26)大尉ミコルスキー少校とを殺し、其臣
トランバウムとモルトの謀を露つて、此の一
々にてモルトを殺した。

太陽の吸明性は、太陽の表面にとどめて、太陽風
風を通過する合成電気水素電離層によつて太陽電
離層に吸収作用が現れれば是するので、その吸収効
率を算りかねばその根本が何、原因が何であるかを知
ることができる。

又、過済中の火災は、安心が無に入つて始める其にともなる被災建物の発生の少それ故なく、又つて其がそれ又上んびんとの間に火花放電に起因する原因紹介して放電被災の現象を示す前に論述することが可い。又オランの現象を説明することもて見る實を以て挙げた後である。

さらに機器が複雑化形であるので高木を工場と
より良い生産性を以て運営されかづるに努力であ
る。

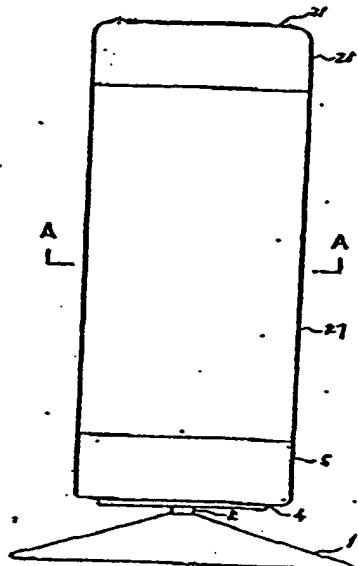
· 河南 · 郑州文博带

第二回林玉娘、第三回林平玉娘

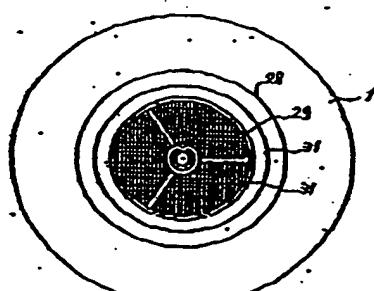
西側、或ひは北東側へと進むに於ける成層帶、
又は河谷内側へと進むに於ける成層帶、第Ⅱ帶
は河谷側に於ける成層帶、第Ⅲ帶は河谷側
に於ける河床大層帶成層帶、第Ⅳ帶は河谷
大層の河床側に於ける河床大層帶成層帶である。

出版人 中国出版社
代理人 三 喜

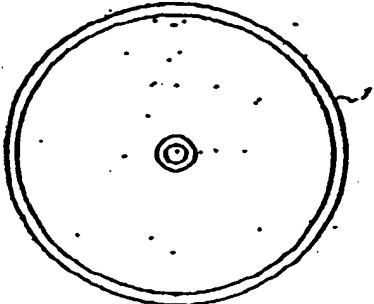
第 一 圖



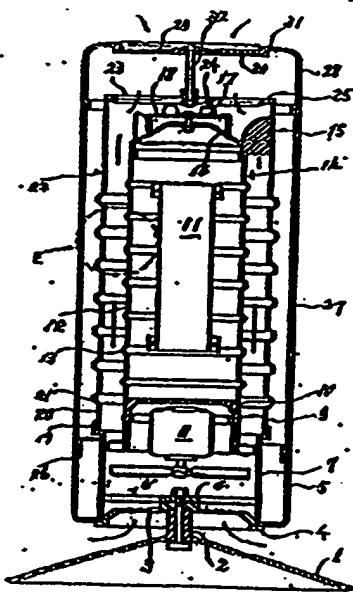
第 2 图



三



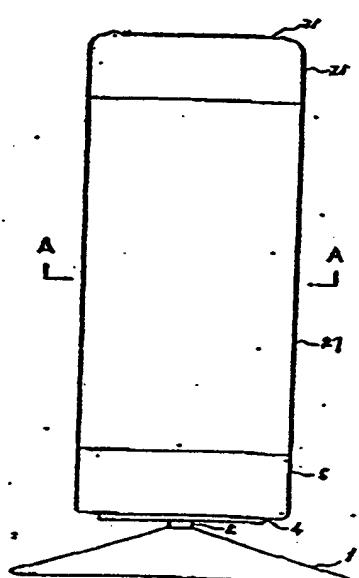
第 4 回



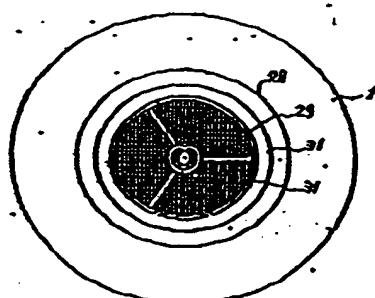
西原、今本博士は又河内一帯に於ける城壁跡、
、又この城跡は一帯の天守台を有する城壁跡、其の城
跡は、河内に於ける最大の城天守台、又河内城の天守台
天守台を有する河内最大の城天守台である。天守台は可笑
天守台の天守台に於ける河内天守台である。

勸善人 有誠念茲 嘉之指工
代罪人 三

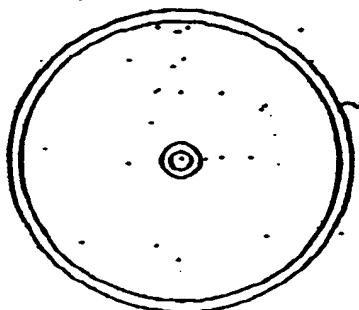
卷一



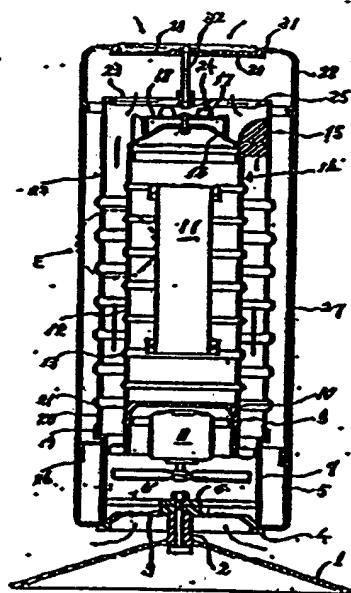
第 2 図



第三圖

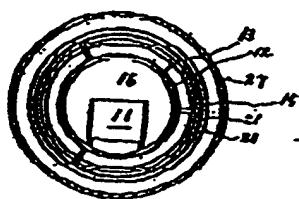


第4回

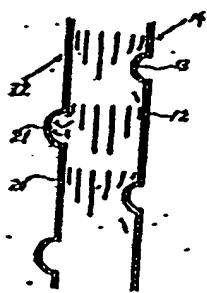


特開昭51-90077 (5)

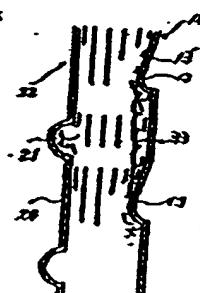
第5図



第6図



第7図



第8図



THIS PAGE BLANK (USPTO)

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.

THIS PAGE BLANK (USPTO)